

Report By:

**National TAB
1329 E. KEMPER ROAD
SUITE 4210
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**Report: Final TAB Report
Function: Test, Adjust, & Balance
Date: 11/09/2022**

PROJECT
11-07 FAMILY DOLLAR - CHARLESTON, MO
351 EAST MARSHALL ST
CHARLESTON, MO 63834

Client

Oliphant Heating
208 WOLLARD BLVD
RICHMOND, MO

National TAB

Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

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Project Summary

The summary below provides a quick understanding of our scope of work and general testing procedures. Enclosed in the report is further detail about your building performance including recommendations, asset data, and pictures. Our focus is to work with the trades to remedy any issues or deficiencies during the actual field balancing and not after the balancing has occurred to achieve a positive environment and outcome. The level of success is determined by the availability of the trades, possible parts needed, or time constraints.

RTU's (Roof Top Units) w/ Diffusers

Each of the RTU's were measured at their terminal devices or via traverse to establish a total flow for that unit. Each RTU was adjusted to within tolerance of the engineer's design flow. Each outlet was then adjusted to within tolerance of the design flow. Outside air was measured by reading the intake air opening with a velocity grid and multiplying by the free area. The outside air damper was adjusted until the airflow was within the design requirements. Any equipment that fell outside of that tolerance is noted throughout the report.

Ceiling Exhaust Fans

The ceiling exhaust fans were measured using a flow hood. If speed adjustment was provided, the fan speed was adjusted to within design tolerance. Any equipment that fell outside of this tolerance is noted throughout the report.

Final Building Tests

After completing the test and balance the final building pressure was measured. It was confirmed that the building pressure fell within acceptable tolerances of $-0.02''$ wc to $+0.02''$ wc and that the pressure measurement coincides with the actual and design net airflow. Any deviations from these standards are noted throughout the report.

AIR BALANCE SCHEDULE

UNIT	AREA SERVED	HVAC SUPPLY		HVAC RETURN		HVAC OUTDOOR		OA %		HOOD MAKE-UP		HOOD EXHAUST		GENERAL EXH.	
		DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
RTU-1	STORAGE	1400	1412	1250	1251	150	161	10.7%	11.4%						
RTU-2	WEST SALES	2800	2761	2150	2105	650	656	23.2%	23.8%						
RTU-3	EAST SALES	2800	2721	2150	2106	650	615	23.2%	22.6%						
RTU-4	SOUTH SALES	3500	3544	2725	2756	775	788	22.1%	22.2%						
EF-1	RESTROOM													75	101
EF-2	RESTROOM													75	99
TOTALS		10500	10438	8275	8218	2225	2220			0	0	0	0	150	200

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	2225	2220
TOTAL EXHAUST	150	200
NET AIRFLOW	2075	2020

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	0.016
SIDE	
REAR	0.016
AVERAGE	0.016

FINAL CHECKS

- ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✓
- MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✓
- PRESSURE FALLS WITHIN IMC TOLERANCE OF +/-0.02" W.C. ✓

NOTES:



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11-07 FAMILY DOLLAR - CHARLESTON, MO

CheckList Information

Name : SITE PICTURES **Status :** NotSubmitted
Assigned Organization : National TAB **Asset :**
Requesting Organization : National TAB

CheckList Item Details

RTU-1



RTU1.jpg

RTU-2



FuseIT4c13909ef62d49....

RTU-3



FuseIT0d003bb46c1a47....

RTU-4



FuseIT60bc087f5a0645....

EF-1



FuseIT4f8a2c54698546....

EF-2



FuseITc4c3e00f9d1b43....

Notes/Comments :



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CheckList Information

Name : TECH - STEP 1: INITIAL WALKTHROUGH **Status :** Submitted

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

INITIAL SITE WALKTHROUGH

Review Plan Review Checklist, has it been signed off and meets our standards to start balancing? If not contact processor to ensure job is ready.	YES
All diffusers and grilles are installed and match design?	YES
Thermostats have power?	YES
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	YES

Notes/Comments :



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CheckList Information

Name :	TECH - STEP 2: UNIT DATA AND EVAL	Status :	Submitted
Assigned Organization :	National TAB	Asset :	
Requesting Organization :	National TAB		

CheckList Item Details

UNIT DATA AND EVALUATION WHILE GATHERING UNIT DATA CHECK THE FOLLOWING:

RTU's/AHU's	YES
Economizers are assembled and functional?	YES
DCV Max damper opening position is set to minimum?	YES
Free cooling enthalpy set point set for lowest setting (Typically "D")	YES
Motors are all operating below the FLA rating?	YES
Are belts tight?	YES
If direct drive unit is the speed controller working.	YES
Is gas piping installed and valves turned on?	YES
Unit free of noticeable noise and vibration	YES
EF's	
Rotation is correct?	YES
Belts are tight?	DD
There is no major leakage around base of fan?	YES
Is the motor operating below the motor FLA rating?	YES
For restroom fan(s) is the back draft damper installed and can it fully open?	YES
Unit free of noticeable noise and vibration?	YES

DOCUMENTATION

Have trades/general contractor been notified about any issues and are they created on FaciliBuild? YES

Notes/Comments :



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CheckList Information

Name : TECH - STEP 3: TEST, ADJUST AND BALANCE **Status :** Submitted

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:

DURING TESTING MAKE NOTE OF THE FOLLOWING:

Is space free of drafting?	YES
Is space comfortable in all areas?	YES
Is the space free of ventilation noise?	YES
If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".	NA

Notes/Comments :



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CheckList Information

Name : TECH - STEP 4: FINAL TESTS **Status :** Submitted

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

FINAL TESTS

ADDITIONAL

Thermostats are programmed?

PROGRAMMED BY FAMILY DOLLAR

Notes/Comments :



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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: AHU/RTU

Asset: RTU1

AREA:STORAGE

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	3222C07119
Model Num	NA	48FCEA05A2A5A0A0A0
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	28.25x14
Num Final Filter 1	-	2
Final Filter Size 1	-	16x25x2

Motor Data		
	Design	Actual
Motor MFG	-	[1]
Frame	-	[1]
Horsepower	-	[1]
Motor Rpm	-	[1]
Phase	3	1
Rated Voltage	208	208/230
Rated Amperage	-	7.1

Drive Data		
	Design	Actual
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	DD
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	Actual
SF CFM	1400	1412
SF RPM	-	1447
RA CFM	1250	1251
OA CFM	150	161
RL Voltage	-	213
RL Amperage	-	6.6
SF Rotation	-	CW, CORRECT
Min OA Damper Position	-	0.5"
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.20"
Fan Suction SP	-	-0.38"
Fan Discharge SP	-	0.22"
Total ESP	1.0"	0.42"
Fan Total SP	-	0.60"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Travis Halter

Notes: [1] Motor sticker not accessible, motor data taken from unit sticker.



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Project:11-07 FAMILY DOLLAR - CHARLESTON, MO

AHU/RTU

Diffuser Supply (GRD)

RTU1/STORAGE

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	STORAGE	D	12"	275	0.58	324	407	289	105.1
SGRD2	STORAGE	D	12"	275	0.58	315	389	276	100.4
SGRD3	STORAGE	D	14"	275	0.58	271	359	255	92.7
SGRD4	STORAGE	D	14"	275	0.58	291	398	283	102.9
SGRD5	STORAGE	A	8"	100	1	252	145	103	103.0
SGRD6	STORAGE	C	8"	50	1	157	69	49	98.0
SGRD7	STORAGE	A	8"	100	1	180	152	108	108.0
SGRD8	STORAGE	C	8"	50	1	189	69	49	98.0

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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: AHU/RTU

Asset: RTU2

AREA:WEST SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	1922P42333
Model Num	NA	48TC08A2A5A0A0A0
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35x19
Num Final Filter 1	-	4
Final Filter Size 1	-	16x20x2

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	56HZ
Horsepower	-	NL
Motor Rpm	-	1725
Phase	3	3
Rated Voltage	208	208-230
Rated Amperage	-	8.8-8.6

Drive Data		
	Design	Actual
Motor Sheave Size	-	VM50
Motor Bore Size	-	0.875"
Motor Sheave SetPt	-	5
Fan Sheave Size	-	8.25"
Fan Sheave Bore	-	1"
Belt CL Distance	-	17"
Num of Belts	-	1
Belt Size	-	AX52
Belt Alignment	-	GOOD

Completed By: Travis Halter

Notes:

Test Data		
	Design	Actual
SF CFM	2800	2761
SF RPM	-	771
RA CFM	2150	2105
OA CFM	650	656
RL Voltage	-	213/212/212
RL Amperage	-	4.8/4.8/4.8
SF Rotation	-	CCW, CORRECT
Min OA Damper Position	-	0.375"
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.49"
Fan Suction SP	-	-0.71"
Fan Discharge SP	-	0.18"
Total ESP	1.0"	0.67"
Fan Total SP	-	0.89"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES



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Project:11-07 FAMILY DOLLAR - CHARLESTON, MO

AHU/RTU

Diffuser Supply (GRD)

RTU2/WEST SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	WEST SALES	B	12"	350	1	332	332	315	90.0
SGRD2	WEST SALES	B	12"	350	1	355	355	355	101.4
SGRD3	WEST SALES	B	12"	350	1	371	371	371	106.0
SGRD4	WEST SALES	B	12"	350	1	324	324	324	92.6
SGRD5	WEST SALES	B	12"	350	1	316	316	316	90.3
SGRD6	WEST SALES	B	12"	350	1	371	371	371	106.0
SGRD7	WEST SALES	B	12"	350	1	384	384	384	109.7
SGRD8	WEST SALES	B	12"	350	1	325	325	325	92.9

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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: AHU/RTU

Asset: RTU3

AREA:EAST SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	1922P42329
Model Num	NA	48TCEM08A2A5A0A0A0
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35x19
Num Final Filter 1	-	5
Final Filter Size 1	-	16x20x2

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	56HZ
Horsepower	-	NL
Motor Rpm	-	1725
Phase	3	3
Rated Voltage	208	208-230
Rated Amperage	-	8.8-8.6

Drive Data		
	Design	Actual
Motor Sheave Size	-	VM50
Motor Bore Size	-	0.875"
Motor Sheave SetPt	-	5
Fan Sheave Size	-	8.25"
Fan Sheave Bore	-	1"
Belt CL Distance	-	17.5"
Num of Belts	-	1
Belt Size	-	AX52
Belt Alignment	-	GOOD

Completed By: Travis Halter

Notes:

Test Data		
	Design	Actual
SF CFM	2800	2721
SF RPM	-	779
RA CFM	2150	2106
OA CFM	650	615
RL Voltage	-	212/212/213
RL Amperage	-	5.2/5.2/5.2
SF Rotation	-	CCW, CORRECT
Min OA Damper Position	-	0.375"
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.45"
Fan Suction SP	-	-0.67"
Fan Discharge SP	-	0.28"
Total ESP	1.0"	0.73"
Fan Total SP	-	0.95"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES



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Project:11-07 FAMILY DOLLAR - CHARLESTON, MO

AHU/RTU

Diffuser Supply (GRD)

RTU3/EAST SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	EAST SALES	B	12"	350	1	316	316	316	90.3
SGRD2	EAST SALES	B	12"	350	1	333	333	333	95.1
SGRD3	EAST SALES	B	12"	350	1	341	341	341	97.4
SGRD4	EAST SALES	B	12"	350	1	323	323	323	92.3
SGRD5	EAST SALES	B	12"	350	1	320	320	320	91.4
SGRD6	EAST SALES	B	12"	350	1	355	355	355	101.4
SGRD7	EAST SALES	B	12"	350	1	379	379	379	108.3
SGRD8	EAST SALES	B	12"	350	1	354	354	354	101.1

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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: AHU/RTU

Asset: RTU4

AREA:SOUTH SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	1622P80507
Model Num	NA	48HCED12A2M5A6W1M0
Type	CARRIER	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35x19
Num Final Filter 1	-	4
Final Filter Size 1	-	20x20x2

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	56HZ
Horsepower	-	NL
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	208	230/460
Rated Amperage	-	9.2/4.6

Drive Data		
	Design	Actual
Motor Sheave Size	-	VM50
Motor Bore Size	-	0.875"
Motor Sheave SetPt	-	5
Fan Sheave Size	-	7.25"
Fan Sheave Bore	-	1"
Belt CL Distance	-	17"
Num of Belts	-	1
Belt Size	-	AX49
Belt Alignment	-	GOOD

Completed By: Travis Halter

Notes:

Test Data		
	Design	Actual
SF CFM	3500	3544
SF RPM	-	875
RA CFM	2725	2756
OA CFM	775	788
RL Voltage	-	212/212/212
RL Amperage	-	5.9/5.9/5.9
SF Rotation	-	CCW, CORRECT
Min OA Damper Position	-	0.75" HI / 1.25" LOW
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.74"
Fan Suction SP	-	-1.01"
Fan Discharge SP	-	0.31"
Total ESP	1.0"	1.05"
Fan Total SP	-	1.32"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES



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Project:11-07 FAMILY DOLLAR - CHARLESTON, MO

AHU/RTU

Diffuser Supply (GRD)

RTU4/SOUTH SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	SOUTH SALES	B	12"	440	1	417	465	465	105.7
SGRD2	SOUTH SALES	B	12"	435	1	518	453	453	104.1
SGRD3	SOUTH SALES	B	12"	435	1	459	442	442	101.6
SGRD4	SOUTH SALES	B	12"	440	1	387	409	409	93.0
SGRD5	SOUTH SALES	B	12"	440	1	383	406	406	92.3
SGRD6	SOUTH SALES	B	12"	435	1	490	443	443	101.8
SGRD7	SOUTH SALES	B	12"	435	1	454	467	467	107.4
SGRD8	SOUTH SALES	B	12"	440	1	437	459	459	104.3

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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: FAN - Exhaust

Asset: EF1

AREA:RESTROOM

Unit Data

	Design	Actual
MFG	GREENHECK	BROAN
Model Num	SP-B110	LP80-B
Type	CEILING	CEILING
Configuration	VERTICAL	VERTICAL

Motor Data

	Design	Actual
Motor MFG	-	BROAN-NUTONE
Frame	-	NL
Horsepower	-	4.4W
Motor Rpm	-	735
Phase	1	1
Voltage (rated)	120	120
Amperage (rated)	-	0.18
Service Factor	-	1.0

Test Data

	Design	Actual
CFM	75	101
Fan RPM	-	DD
Fan Rotation	-	CCW, CORRECT
Motor RPM	-	DD
System SetPt	-	SINGLE SPEED
RL Voltage	-	122
RL Amperage	-	0.17
Total ESP	0.25"	[1]
Fan Inlet SP	-	ATM
Fan Discharge SP	-	[1]

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Notes:[1] Ductwork located above hard ceiling, unable to take static pressure.



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Project: 11-07 FAMILY DOLLAR - CHARLESTON, MO

System/Unit: FAN - Exhaust

Asset: EF2

AREA:RESTROOM

Unit Data		
	Design	Actual
MFG	GREENHECK	BROAN
Model Num	SP-B110	LP80-B
Type	CEILING	CEILING
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	Actual
Motor MFG	-	BROAN-NUTONE
Frame	-	NL
Horsepower	-	4.4W
Motor Rpm	-	735
Phase	1	1
Voltage (rated)	120	120
Amperage (rated)	-	0.18
Service Factor	-	1.0

Test Data		
	Design	Actual
CFM	75	99
Fan RPM	-	DD
Fan Rotation	-	CCW, CORRECT
Motor RPM	-	DD
System SetPt	-	SINGLE SPEED
RL Voltage	-	122
RL Amperage	-	0.18
Total ESP	0.25"	[1]
Fan Inlet SP	-	ATM
Fan Discharge SP	-	[1]

Completed By: Travis Halter

Notes:[1] Ductwork located above hard ceiling, unable to take static pressure.

